AMENDMENTS TO THE CLAIMS

The listing of the claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A method for analyzing multivariate images, comprising:

a) providing a data matrix **D** containing measured spectral data,

b) ~~transforming the data matrix **D**, using a wavelet transform,~~ applying at least one wavelet transform to the data matrix **D** to obtain a transformed data matrix $\tilde{\mathbf{D}}$ comprising an approximation matrix $\tilde{\mathbf{D}}_a$ and a detail matrix $\tilde{\mathbf{D}}_d$,

~~c) thresholding the wavelet coefficients of the transformed data matrix $\tilde{\mathbf{D}}$;~~

~~d)~~ c) performing an image analysis on the ~~transformed data matrix $\tilde{\mathbf{D}}$ to obtain a spatially compressed concentration matrix $\tilde{\mathbf{C}}$ and a~~ approximation matrix $\tilde{\mathbf{D}}_a$ to obtain an approximation concentration matrix $\tilde{\mathbf{C}}_a$ and a spectral shapes matrix **S**, and

~~e)~~ d) computing a concentration matrix **C** from the ~~spatially compressed concentration matrix $\tilde{\mathbf{C}}$~~ approximation concentration matrix $\tilde{\mathbf{C}}_a$, the detail matrix $\tilde{\mathbf{D}}_d$, and the spectral shapes matrix **S**.

2. (canceled)

3. (currently amended): The method of Claim 1, wherein the at least one wavelet transform comprises a Haar transform.

4. (canceled)

5. (canceled)

6. (currently amended): The method of Claim 1, wherein the image analysis of step ~~d)~~ c) comprises an alternating least squares analysis and the ~~spatially compressed concentration matrix $\tilde{\mathbf{C}}$~~ approximation concentration matrix $\tilde{\mathbf{C}}_a$ and

the spectral shapes matrix **S** are obtained from a constrained least squares solution of $\cancel{\min_{\tilde{C},S}\left\|\tilde{D}-\tilde{C}S^T\right\|_F}$ $\underline{\min\left\|\tilde{D}_a-\tilde{C}_a S^T\right\|_F}$.

7. (currently amended): The method of Claim 6, wherein the alternating least squares analysis comprises a transformed non-negativity constraint $\underline{\tilde{C}_a \geq 0}$.

8. (currently amended): The method of Claim 1, wherein the computing step ~~e)~~ d) comprises:

computing a detail concentration matrix $\tilde{C}_d$ from the detail matrix $\tilde{D}_d$ and the spectral shapes matrix **S**;

combining the approximation concentration matrix $\tilde{C}_a$ and the detail concentration matrix $\tilde{C}_d$ to provide a transformed concentration matrix $\tilde{C}$; and

applying an inverse wavelet transform to the ~~spatially compressed concentration matrix~~ $\cancel{\tilde{C}}$ transformed concentration matrix $\tilde{C}$ to provide the concentration matrix **C**.

9. (canceled)

10. (previously presented): A method for analyzing multivariate images, comprising:

a) providing a data factor matrix **A** and a data factor matrix **B** obtained from a factorization of measured spectral data **D**,

b) transforming the data factor matrix **A**, using a wavelet transform, to obtain a transformed data factor matrix $\tilde{\mathbf{A}}$,

c) thresholding the wavelet coefficients of the transformed data factor matrix $\tilde{\mathbf{A}}$,

d) performing an image analysis on the transformed data factor matrix $\tilde{\mathbf{A}}$ and data factor matrix **B** to obtain a spatially compressed concentration matrix $\tilde{\mathbf{C}}$ and a spectral shapes matrix **S**, and

e) computing a concentration matrix **C** from the spatially compressed concentration matrix $\tilde{\mathbf{C}}$.

11. (previously presented): The method of Claim 10, wherein the data factor matrix **A** comprises a total of *j* blocks of data factors $\mathbf{A}_i$ and the data factor matrix **B** comprises *k* blocks of data factors $\mathbf{B}_i$, thereby providing a concentration block $\mathbf{C}_i$ in step e), and wherein steps a) through e) are repeated sequentially until the concentration matrix **C** is accumulated blockwise, according to $\mathbf{C} = [\mathbf{C}_1 \quad \mathbf{C}_2 \quad \cdots \quad \mathbf{C}_{j-1} \quad \mathbf{C}_j]$.

12. (original): The method of Claim 10, wherein the wavelet transform comprises a Haar transform.

13. (canceled)

14. (previously presented): The method of Claim 10, wherein the thresholding comprises decimating the detail coefficients.

15. (previously presented): The method of Claim 10, wherein the image analysis of step d) comprises an alternating least squares analysis and the spatially

compressed concentration matrix $\tilde{\mathbf{C}}$ and the spectral shapes matrix **S** are obtained from a constrained least squares solution of $\min_{\tilde{\mathbf{C}},\mathbf{S}} \left\| \tilde{\mathbf{A}}\mathbf{B}^{\mathrm{T}} - \tilde{\mathbf{C}}\mathbf{S}^{\mathrm{T}} \right\|_{\mathrm{F}}$.

16. (original): The method of Claim 15, wherein the alternating least squares analysis comprises a transformed non-negativity constraint.

17. (previously presented): The method of Claim 10, wherein the computing step e) comprises applying an inverse wavelet transform to the spatially compressed concentration matrix $\tilde{\mathbf{C}}$ to provide the concentration matrix **C**.

18. (previously presented): The method of Claim 10, wherein the computing step e) comprises projecting the product of the data factor matrix **A** and the data factor matrix **B** from step a) onto the spectral shapes matrix **S** from step d), according to $\min_{\mathbf{C}} \left\| \mathbf{A}\mathbf{B}^{\mathrm{T}} - \mathbf{C}\mathbf{S}^{\mathrm{T}} \right\|_{\mathrm{F}}$ and subject to appropriate constraints.

19. (original): The method of Claim 10, wherein the data factor matrix **A** comprises a scores matrix **T** and the data factor matrix **B** comprises a loadings matrix **P**, and wherein **T** and **P** are obtained from a principal components analysis of the measured spectral data **D**, according to $\mathbf{D} = \mathbf{T}\mathbf{P}^{\mathrm{T}}$.

20. (original): The method of Claim 19, wherein **T** and **P** represent the significant components of the principal components.

21. (previously presented): The method of Claim 1, wherein the data matrix **D** is weighted.

22. (previously presented): The method of Claim 10, wherein the data factor matrix **A** and the data factor matrix **B** are weighted.

23. (new): The method of Claim 1, wherein the wavelet transform applying step b) comprises:

folding the data matrix $\mathbf{D}$ into a $(x+1)$-dimensional multiway array $\underline{\mathbf{D}}$ consisting of x spatial dimensions and 1 spectral dimension comprising p spectral channels, wherein x = 1, 2, or 3;

applying an independent wavelet transform to each of the x spatial dimensions for each of the p spectral channels to provide a transformed multiway array $\tilde{\underline{\mathbf{D}}}$;

partitioning the transformed multiway array $\tilde{\underline{\mathbf{D}}}$ into a multiway approximation array $\tilde{\underline{\mathbf{D}}}_a$ and a multiway detail array $\tilde{\underline{\mathbf{D}}}_d$; and

unfolding the multiway approximation array $\tilde{\underline{\mathbf{D}}}_a$ to obtain the approximation matrix $\tilde{\mathbf{D}}_a$ and the detail matrix $\tilde{\mathbf{D}}_d$,.

24. (new): The method of Claim 23, wherein the computing step d) comprises:

computing a detail concentration matrix $\tilde{\mathbf{C}}_d$ from the detail matrix $\tilde{\mathbf{D}}_d$ and the spectral shapes matrix $\mathbf{S}$;

combining the approximation concentration matrix $\tilde{\mathbf{C}}_a$ and the detail concentration matrix $\tilde{\mathbf{C}}_d$ to provide a transformed concentration matrix $\tilde{\mathbf{C}}$;

folding the transformed concentration matrix $\tilde{\mathbf{C}}$ into an $(x+1)$-dimensional transformed concentration matrix $\tilde{\underline{\mathbf{C}}}$;

applying an independent inverse wavelet transform to each of the x spatial dimensions of the transformed concentration array $\tilde{\underline{\mathbf{C}}}$ to obtain the multiway concentration array $\underline{\mathbf{C}}$; and

unfolding the multiway concentration array $\underline{\mathbf{C}}$ to obtain the concentration matrix $\mathbf{C}$.

25. (new): The method of Claim 1, wherein $\mathbf{D}$ is a 2D data matrix comprising m rows and n columns and the wavelet transforms $\mathbf{W}$ are applied according to $(\mathbf{W}_n \otimes \mathbf{W}_m) \times \mathbf{D} = \tilde{\mathbf{D}}$.

26. (new): A method for analyzing multivariate images, comprising:

a) providing a data matrix $\mathbf{D}$ containing measured spectral data,

b) applying at least one wavelet transform to the data matrix $\mathbf{D}$ to obtain a transformed data matrix $\tilde{\mathbf{D}}$ comprising an approximation matrix $\tilde{\mathbf{D}}_a$,

c) performing an image analysis on the approximation matrix $\tilde{\mathbf{D}}_a$ to obtain a spectral shapes matrix $\mathbf{S}$, and

d) computing a concentration matrix $\mathbf{C}$ from the data matrix $\mathbf{D}$, and the spectral shapes matrix $\mathbf{S}$.

27. (new): The method of Claim 26, wherein the at least one wavelet transform comprises a Haar transform.

28. (new): The method of Claim 26, wherein the image analysis of step c) comprises an alternating least squares analysis and an approximation concentration matrix $\tilde{\mathbf{C}}_a$ and the spectral shapes matrix $\mathbf{S}$ are obtained from a constrained least squares solution of $\min \left\| \tilde{\mathbf{D}}_a - \tilde{\mathbf{C}}_a \mathbf{S}^{\mathrm{T}} \right\|_{\mathrm{F}}$.

29. (new): The method of Claim 28, wherein the alternating least squares analysis comprises a transformed non-negativity constraint $\tilde{\mathbf{C}}_a \geq 0$.

30. (new): The method of Claim 26, wherein the computing step d) comprises projecting the data matrix $\mathbf{D}$ from step a) onto the spectral shapes matrix $\mathbf{S}$ from step c), according to $\min_{\mathbf{C}} \left\| \mathbf{D} - \mathbf{C}\mathbf{S}^{\mathrm{T}} \right\|_{\mathrm{F}}$, subject to constraints.

31. (new): The method of Claim 26, wherein the wavelet transforms applying step b) comprises:

folding the data matrix **D** into a (x+1)-dimensional multiway array $\underline{\mathbf{D}}$ consisting of x spatial dimensions and 1 spectral dimension comprising p spectral channels, wherein x = 1, 2, or 3;

applying an independent wavelet transform to each of the x spatial dimensions for each of the p spectral channels to provide a transformed multiway array $\underline{\tilde{\mathbf{D}}}$;

decimating the detail coefficients of the transformed multiway array $\underline{\tilde{\mathbf{D}}}$ to obtain a multiway approximation array $\underline{\tilde{\mathbf{D}}}_a$; and

unfolding the multiway approximation array $\underline{\tilde{\mathbf{D}}}_a$ to obtain the approximation matrix $\tilde{\mathbf{D}}_a$.